

West Valley Demonstration Project

Doc. Number WVNS-DC-064

Revision Number 1

Revision Date 05/09/94

Engineering Release #2837

HLW ☒ YES ☐ NO ☐ N/A

HLW Screening Form Attached? ☐ YES ☒ NO

Design Criteria for WVNS High-Level Waste Production Canister

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WVNS RECORD OF REVISION

DOCUMENT

If there are changes to the controlled document, the revision number increases by one. Indicate changes by one of the following:

- Placing an arrow at the beginning of the sentence or paragraph that was revised
- Placing a vertical black line in the margin adjacent to sentence or paragraph that was revised
- Placing the words GENERAL REVISION at the beginning of the text
- Placing either FC#> or PC#> at the beginning of a field/page change

Example:

The arrow in the margin indicates a change.

The vertical line in the margin indicates a change.

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<u>Rev. No.</u>	<u>Description of Changes</u>	<u>Revision On Page(s)</u>	<u>Dated</u>
0	Original Issue	All	01/21/94
1	Per ECN# 7897	3 Figure 4	05/06/94

WVNS RECORD OF REVISION CONTINUATION FORM

Rev. No.	Description of Changes	Revision On Page(s)	Dated
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1.0 SCOPE

The requirements of this design criteria pertain to the stainless steel canisters (Figure 1) to be used in production operations of the WVDP vitrification facility to contain the borosilicate glass waste form as required by the Waste Acceptance Product Specifications for Vitrified High-Level Waste Forms (EM-WAPS). These requirements are further defined by WVDP-185, the Waste Form Compliance Plan for the WVNS High-Level Waste Form.

2.0 FUNCTIONAL REQUIREMENTS

The function of the WVNS Production Canister is to receive and contain the molten borosilicate glass product from the Slurry Fed Ceramic Melter and to serve as a mechanically and chemically durable transfer envelope for the borosilicate glass waste form.

3.0 OPERATIONAL REQUIREMENTS

None

4.0 DESIGN REQUIREMENTS

4.1 Material

- 4.1.1 The canister shell (wall), top and bottom heads, primary and secondary lids, neck, and lifting flange shall be fabricated from 304L stainless steel.
- 4.1.2 Weld filler metal shall be ASME SFA5.9 ER308L.
- 4.1.3 All components shall have a finish which is compatible with the in-cell decontamination process.

4.2 Dimensions

4.2.1 Length

The overall length of the canister, after accounting for the closure method, shall be 3.000m (+0.005m, -0.020m) [118.1 in (+0.197 in, -.787 in)].

4.2.2 Diameter

The outer diameter of the canister, excluding the label, shall be 61.0cm (+1.5cm, -1.0cm) [24.0 in (+0.6 in, -.4 in)]

4.2.3 Wall Thickness

The shells (walls) of the canister shall be 10 ga. stainless steel, nominally .34 cm (.134 in.) thick.

The top and bottom heads shall be nominally .478 cm (.188 in) thick.

4.3 Configuration

4.3.1 Top Head

The top head shall be an ASME Flanged and Dished Head as shown in Figure 2.

4.3.2 Bottom Head

The bottom head shall be a reverse dished and flanged head as shown in Figure 3.

4.3.3 Neck and Lifting Flange

The neck and lifting flange are to be fabricated from a single piece of material and must properly interface with the WVNS grapple. The required interface dimensions are shown in Figure 4.

4.3.4 Primary and Secondary Lids

The primary lid used for canister closure will be a flat disk as shown in Figure 5. It must be compatible with the flange configuration and the remote assembly and welding process. It shall have some means of visually distinguishing the top surface from the bottom.

The geometry of the secondary lid which is to be used as an alternate canister closure is shown in Figure 6.

4.5 Label

Each canister is to be labeled with a five character alphanumeric code, WVXXX where X is a digit. The canister shall be labeled in two locations, on the top shoulder and on the canister side about 60 cm. (23.62 in) from the top.

The identification code shall be applied with the GTAW process using type 308L filler metal and shall be printed in a type size of at least 92 points (1.28 in.) and not more than 144 points (2.00 in). The profile height shall not exceed 0.15 cm (.06 in)

4.6 Welding

4.6.1 Fabrication welding will utilize the gas tungsten arc welding (GTAW) process. All fabrication welds will be inspected by dye penetrant according to Section V of the ASME Boiler and Pressure Vessel Code and meet the criteria of Section VIII.

4.7 Performance requirements

4.7.1 Drop Test

A canister that is representative of the engineering released design, when filled with the appropriate weight and distribution of glass and sealed, shall be capable of withstanding a 7 meter (275.6 in.) drop onto a flat, essentially unyielding surface without breaching. The orientation is to be vertical with the center of gravity over the bottom center.

4.7.2 Free Standing Capability

The canister must be capable of standing upright without support on a flat horizontal surface.

> 4.7.3 Lifting Flange Capability

The lifting flange must be capable of supporting a 2500 kg (5500 lb) from a 3-point lift (120° spacing) with a 1.5 minimum factor of safety without yielding.

4.7.4 Leak-tightness

The canister shall be designed such that the sealed canistered waste form shall be leak-tight to a minimum requirement of 1×10^{-4} atm-cc/sec helium. Helium leak tightness measurements are to be performed in accordance with ASME - Section V, Article 10.

4.7.5 Over-all Dimensions

The canister, when filled with borosilicate glass by the WVNS vitrification process and sealed, must fit completely without forcing when lowered vertically into a right-circular, cylindrical cavity, 64.0 cm in diameter and 3.01 m in length.

5.0 INTERFACE REQUIREMENTS

Components and/or systems with which the canister interfaces:

- Load in/load out facility
- Temporary cover
- In-cell storage racks
- Turntable
- Melter
- Weld Station
 - Weld head
 - Flange conditioning tool
 - Shard sampling tool
 - Glass level measuring tool
- Decon. Station

Transfer Cart
Grapple
CPC Storage Racks
Shipping cask

6.0 QUALITY ASSURANCE REQUIREMENTS

The WVNS Production Canister is a HLW Item and as such must meet West Valley's Quality Assurance requirements for Quality Level B as well as any applicable enhanced requirements imposed by DOE/RW-0214, OCRWM's Quality Assurance Requirement Document, current revision, or superseding document.

The WVNS Production Canister shall have a safety Class N.

7.0 APPLICABLE CODES AND STANDARDS

- 7.1 EM-WAPS, Waste Acceptance Product Specifications for Vitrified High-Level Waste Forms
- 7.2 WVDP-185, Waste Form Compliance Plan for the WVDP High-Level Waste Form
- 7.3 ASME Boiler and Pressure Vessel Code, Sections V and VII
- 7.4 DOE/RW-0333P, OCRWM Quality Assurance Requirements and Description

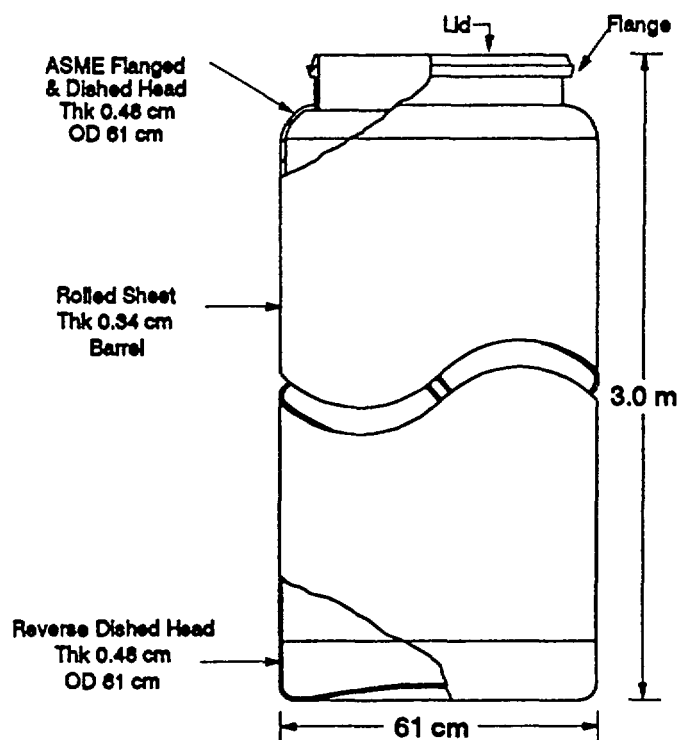


Figure 1

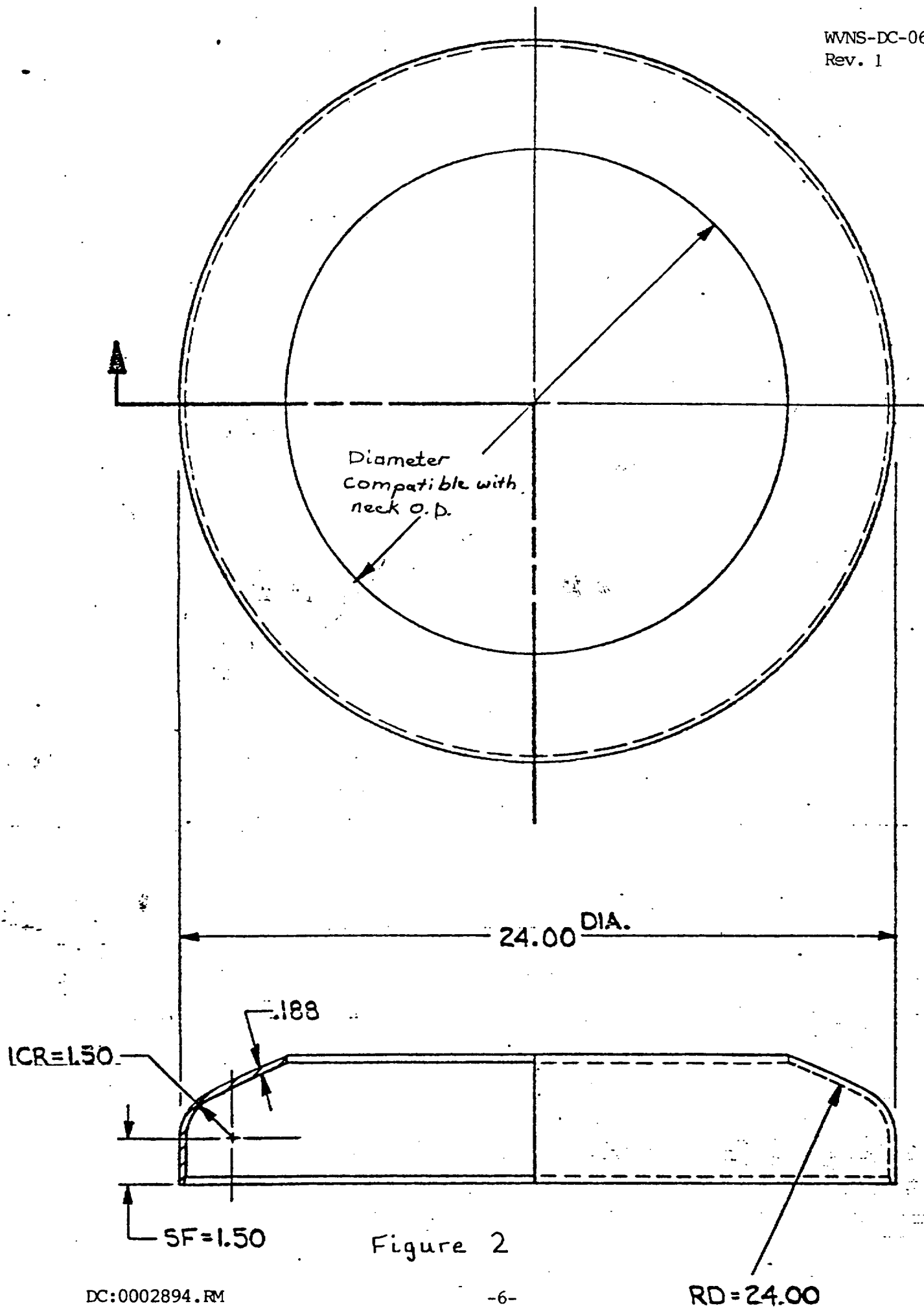


Figure 2

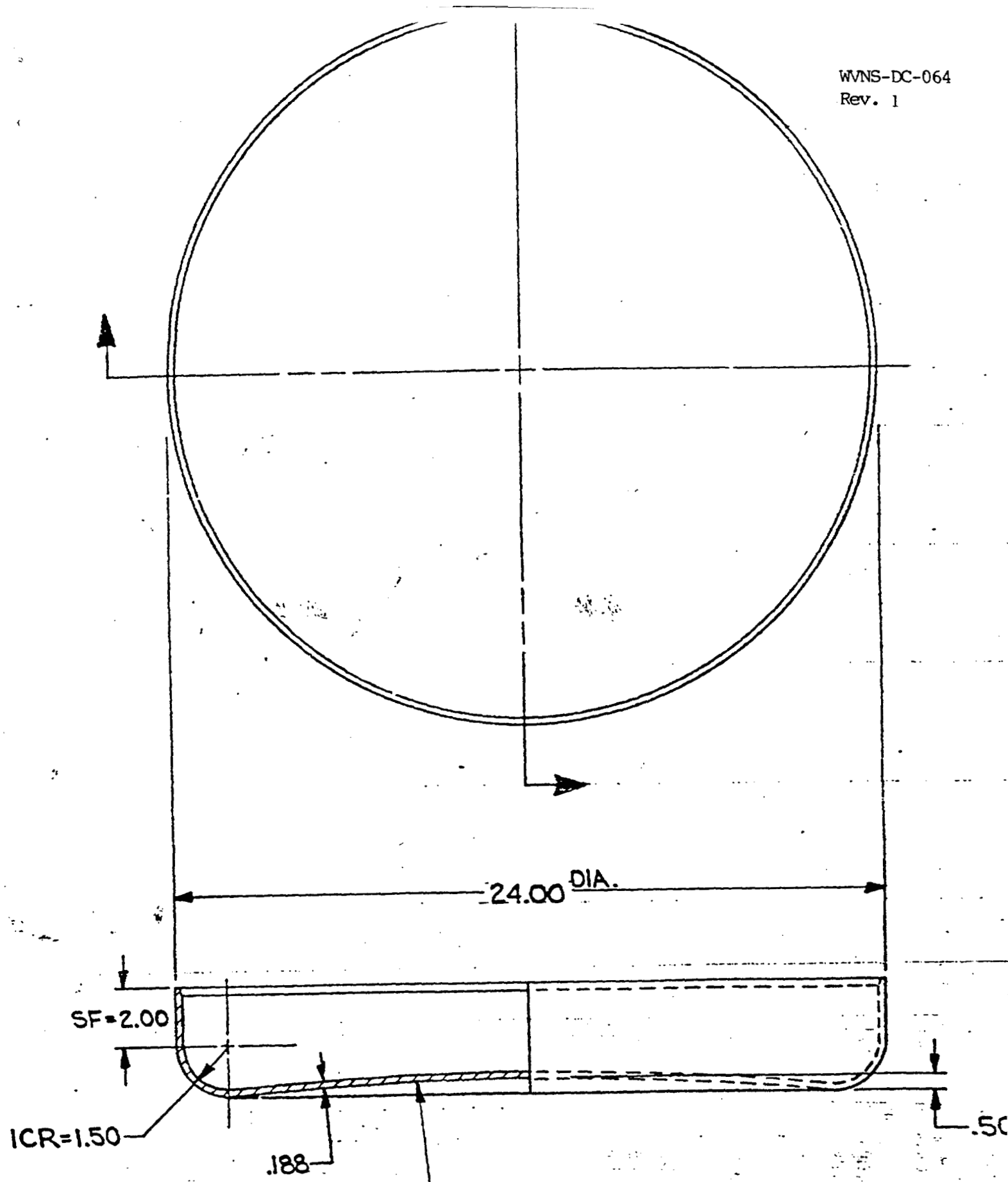


Figure 3

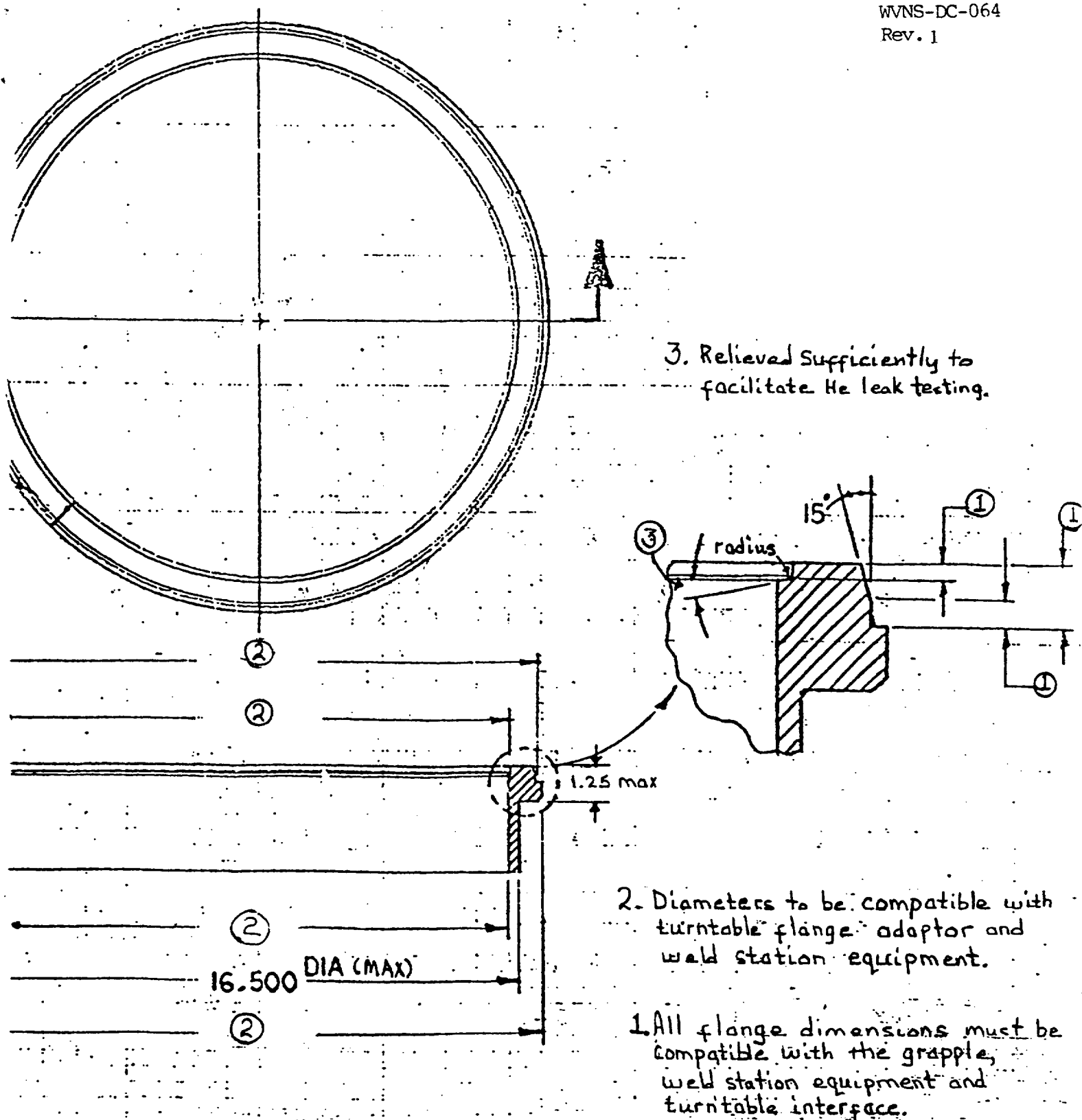
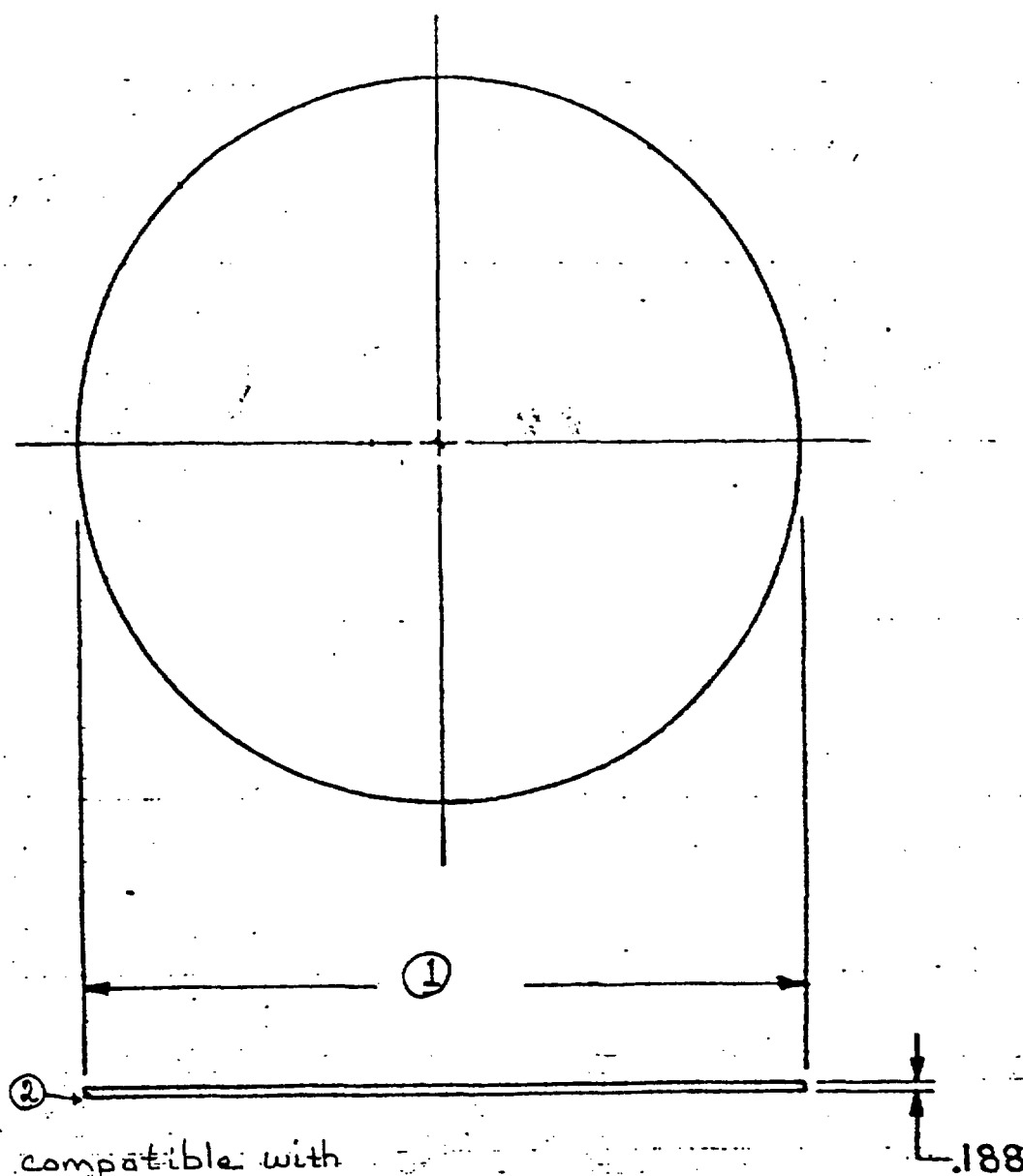


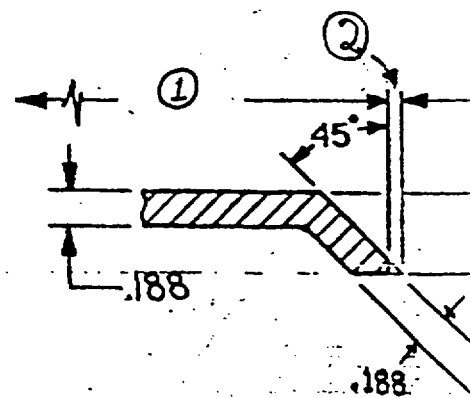
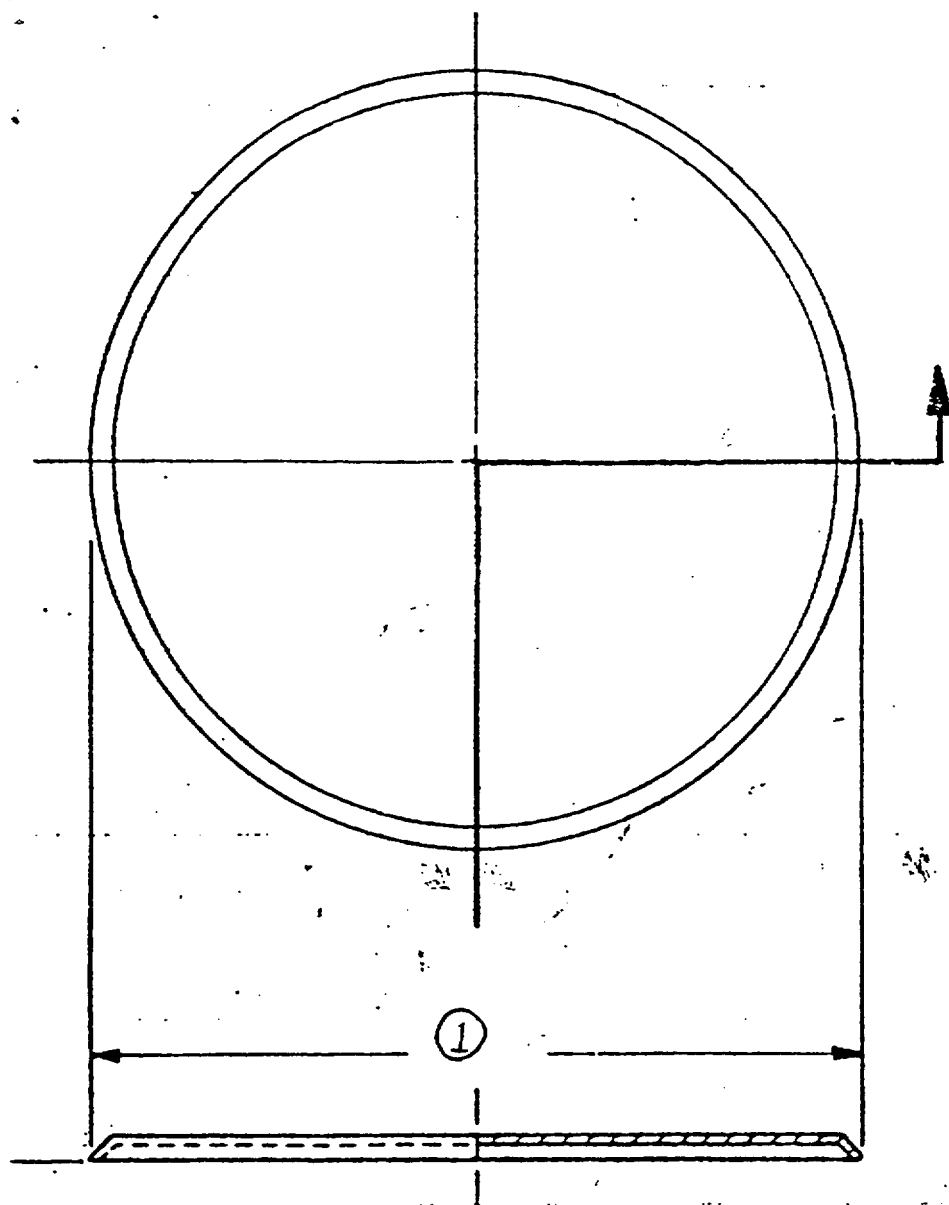
Figure 4



1. Diameter compatible with flange I.D., and remote assembly and welding process.

2. Chamfer or radius on bottom edge compatible with flange counterbore radius.

Figure 5



1. Diameter compatible with flange I. D. and remote assembly and welding process.
2. As required for flange I. D. and welding requirements.

Figure b